

USER GUIDE

NI SMB-2145/2146/2147/2148

Shielded Signal Accessories for NI 5751/5752 Adapter Modules

The NI SMB-2145/2146/2147/2148 (NI SMB-214x) devices are shielded signal accessories for NI FlexRIO™ digitizer adapter modules (NI 5751 and NI 5752). NI SMB-214x accessories provide easy connections to other devices for testing and debugging. The following table describes each of the accessories.

Table 1. NI 214x Signal Accessories

Accessory	Description
NI SMB-2145	NI 5752 analog input accessory
NI SMB-2146	NI 5752 digital I/O accessory
NI SMB-2147	NI 5751 analog input accessory
NI SMB-2148	NI 5751 digital I/O accessory

This guide explains how to set up and use NI SMB-214x signal accessories with NI 5751/5752 adapter modules.

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Conventions



The following conventions are used in this manual:

This icon denotes a note, which alerts you to important information.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on a product, refer to the *Specifications* section for information about precautions to take.

italic

Italic text denotes variables, emphasis, a cross-reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.

monospace

Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

What You Need to Get Started

To set up and use the NI SMB-214x, you need the following items:

- ☐ NI 5751R or NI 5752R, installed in a PXI/PXI Express or CompactPCI chassis



Note The NI 5751R and NI 5752R are comprised of an NI FlexRIO FPGA module and an NI FlexRIO adapter module (NI 5751 or NI 5752).

- ❑ The appropriate cable assembly for your adapter module:

Table 2. NI SMB-214x Cables

Adapter Module/Signal	Cable Description	Part Number
NI 5751 Analog	SHC68-C68-D4	196275A-01
NI 5751 Digital	SHC68-C68-D4	196275A-01
NI 5752 Analog	SHC68-C68-D3	188143B-01
NI 5752 Digital	SHC68-C68-D4	196275A-01

- ❑ At least one 50 Ω cable with SMB connectors

Related Documentation

You may find the following documents helpful as you use the NI SMB-214x.

- *NI 5751R User Guide and Specifications*
- *NI 5752R User Guide and Specifications*
- *NI FlexRIO FPGA Module Installation Guide and Specifications*

These printed documents provide the specifications for your adapter module and your FPGA module. These documents are also available at ni.com/manuals.

Parts Locator

Figures 1-4 show the connectors on each of the NI SMB-214x accessories.

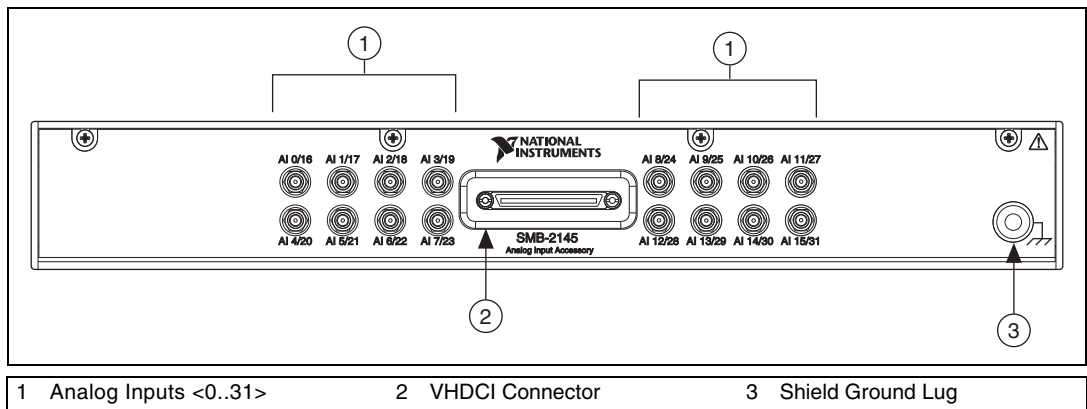


Figure 1. NI SMB-2145 Parts Locator Diagram

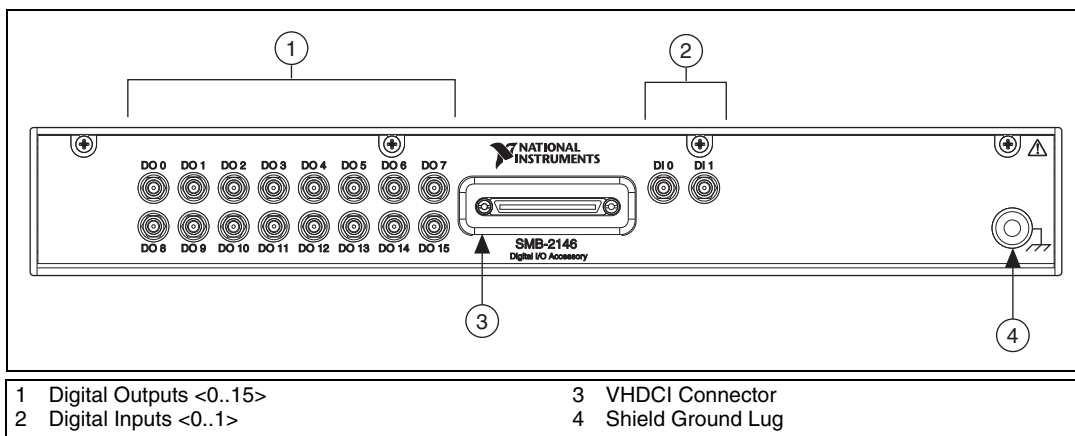


Figure 2. NI SMB-2146 Parts Locator Diagram

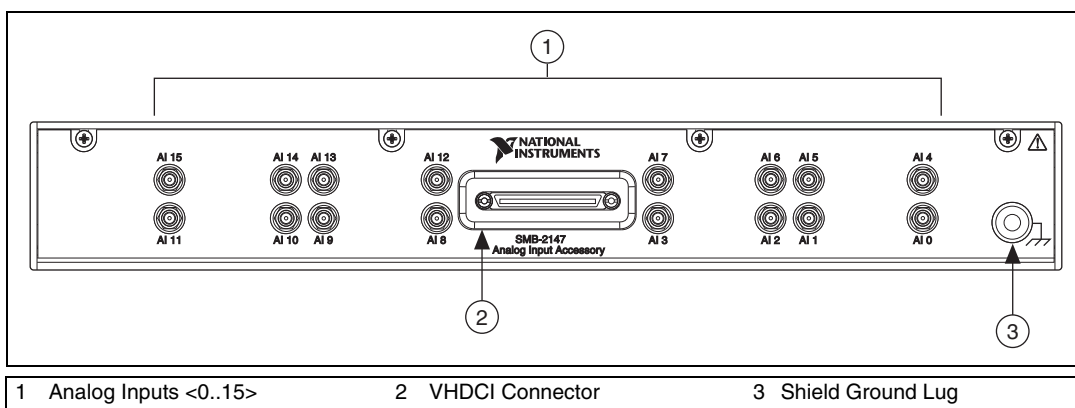


Figure 3. NI SMB-2147 Parts Locator Diagram

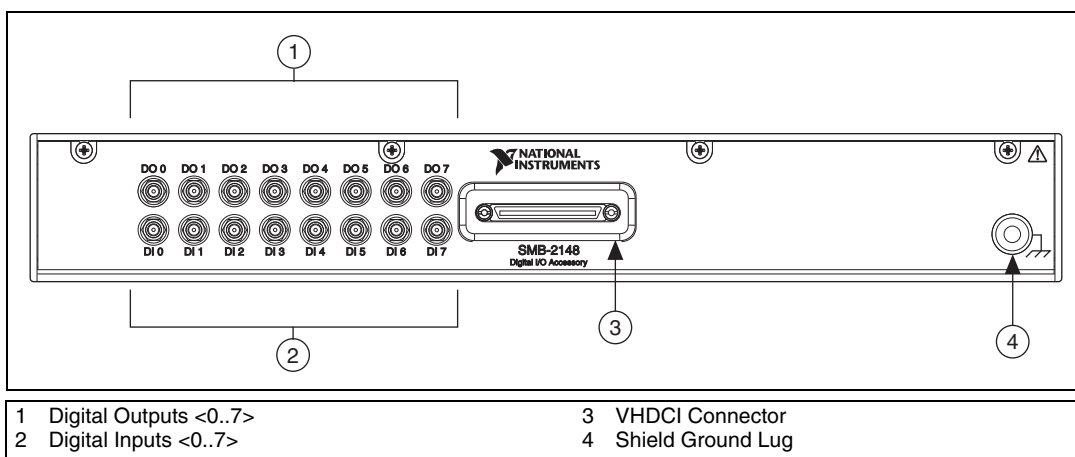


Figure 4. NI SMB-2148 Parts Locator Diagram

Installing Cables



Caution Disconnect power from the adapter module, accessory, and any other connected hardware before connecting the cable to prevent personal injury or damage to the hardware. NI is *not* liable for damage resulting from improper connections.

Complete the following steps to install the cable and any 50 Ω SMB cables.

1. Install the NI 5751R or NI 5752R by following the installation procedure described in the *NI FlexRIO FPGA Module Installation Guide and Specifications*.
2. Remove power from the adapter module by powering down the PXI/PXI Express or CompactPCI chassis or by programmatically removing power from the adapter module. Power down any external hardware intended for connection to this system.
3. Attach either end of the cable assembly to the VHDCI connector on the front panel of the adapter module and secure the cable with the captive screws on the cable connector.



Note Do *not* use cables other than the cables listed in Table 2 with these accessories.

4. Attach and secure the other end of the cable assembly to the VHDCI connector of the NI SMB-214x and secure them together with the captive screws on the cable connector.

Figures 5 and 6 show how to connect your NI SMB-214x accessory to your NI FlexRIO system.

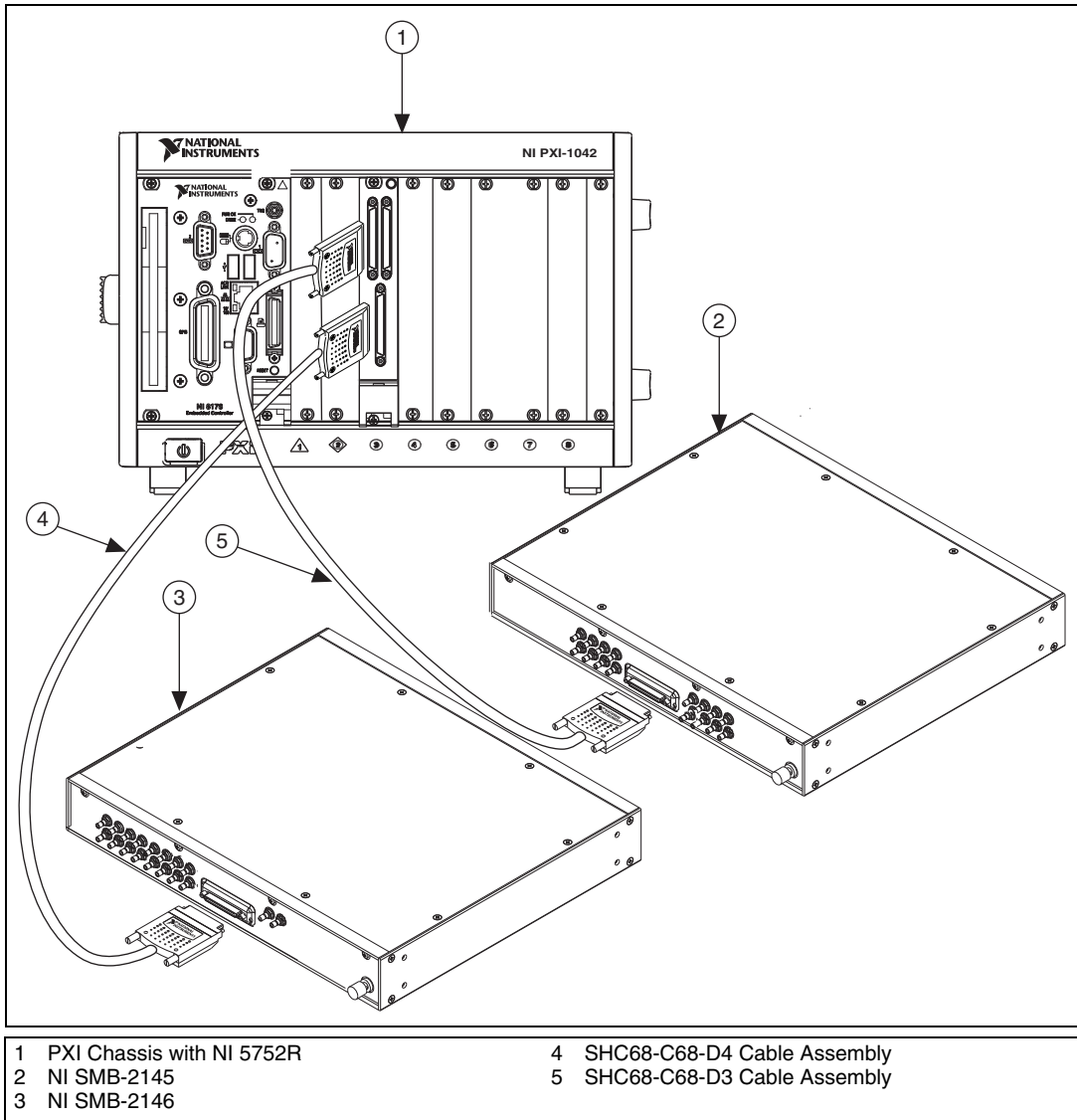


Figure 5. Connecting the NI 5752R to the NI SMB-2145 and NI SMB-2146

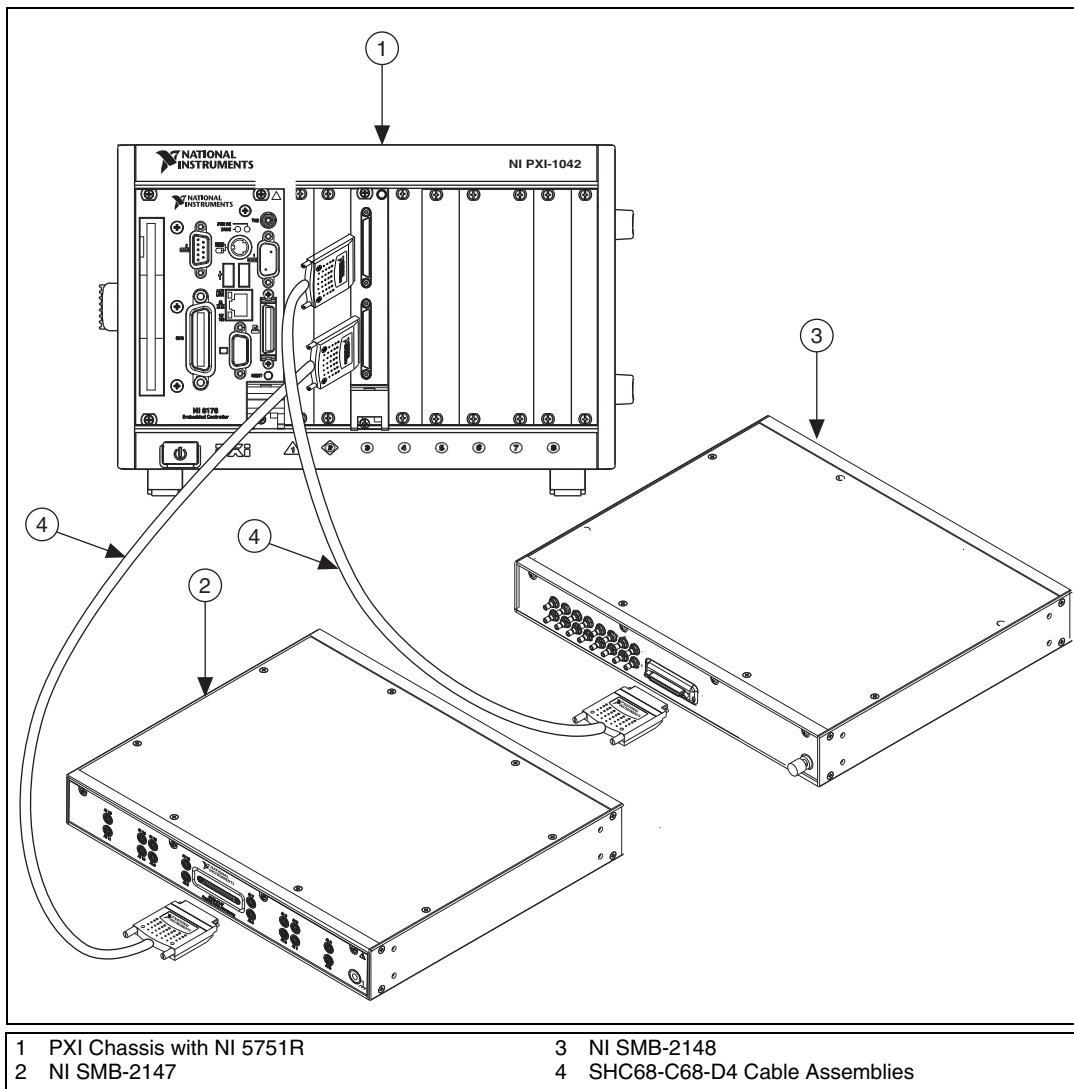


Figure 6. Connecting the NI 5751R to the NI SMB-2147 and NI SMB-2148

5. Make signal connections by connecting SMB cables to NI SMB-214x signal terminals. Refer to the [Connecting Signals](#) section for more information.



Note To ensure a solid ground connection, tighten the SMB connectors by gently snapping them into place.

6. Apply power to the adapter module by powering on the PXI/PXIe or Compact PCI chassis or by programmatically applying power to the adapter module.
7. Power on any external hardware intended for use with this system.

Connecting Signals

The NI SMB-214x provides signal connectivity to the NI 5751/5752 adapter module. You can connect to these signals from the labeled SMB connectors on the NI SMB-214x.



Caution Connections that exceed any of the maximum ratings for the NI SMB-214x or the NI 5751/5752 adapter module can damage the device and the computer. Maximum input ratings are provided in the specifications document that shipped with the adapter module. NI is *not* liable for any damages resulting from such signal connections.

Figures 7 through 10 show the pinouts of the VHDCI connectors of NI SMB-214x accessories. The analog inputs, digital inputs, and digital outputs are connected to corresponding pins on the NI SMB-214x. Refer to Table 3 for the pin descriptions.

Table 3. VHDCI Connector Pinout Descriptions

Pin	Signal Description
AI <0..31>	Analog input channels 0 through 31
DI <0..15>	Digital input channels 0 through 15
DO <0..15>	Digital output channels 0 through 15
GND	Ground reference for signals
RSVD	Reserved for system use. Do not connect signals to these channels.

GND	1	35	GND
AI 0/16	2	36	GND
GND	3	37	AI 1/17
GND	4	38	GND
AI 2/18	5	39	GND
GND	6	40	AI 3/19
GND	7	41	GND
AI 4/20	8	42	GND
GND	9	43	AI 5/21
GND	10	44	GND
AI 6/22	11	45	GND
GND	12	46	AI 7/23
GND	13	47	GND
AI 8/24	14	48	GND
GND	15	49	AI 9/25
GND	16	50	GND
AI 10/26	17	51	GND
GND	18	52	AI 11/27
GND	19	53	GND
AI 12/28	20	54	GND
GND	21	55	AI 13/29
GND	22	56	GND
AI 14/30	23	57	GND
GND	24	58	AI 15/31
GND	25	59	GND
GND	26	60	GND
GND	27	61	GND
GND	28	62	GND
GND	29	63	GND
GND	30	64	GND
GND	31	65	GND
GND	32	66	GND
GND	33	67	GND
GND	34	68	GND

Figure 7. NI SMB-2145 VHDCI Connector Pinout

RSVD	1	35	RSVD
GND	2	36	GND
RSVD	3	37	RSVD
GND	4	38	GND
RSVD	5	39	RSVD
GND	6	40	GND
RSVD	7	41	RSVD
RSVD	8	42	GND
RSVD	9	43	RSVD
GND	10	44	GND
RSVD	11	45	RSVD
GND	12	46	GND
RSVD	13	47	RSVD
GND	14	48	GND
DI 1	15	49	DI 0
GND	16	50	GND
DO 15	17	51	DI 14
GND	18	52	RSVD
DO 13	19	53	DO 12
GND	20	54	GND
DO 11	21	55	DO 10
GND	22	56	GND
DO 9	23	57	DO 8
GND	24	58	GND
DO 7	25	59	DO 6
RSVD	26	60	RSVD
DO 5	27	61	DO 4
GND	28	62	GND
DO 3	29	63	DO 2
RSVD	30	64	RSVD
DO 1	31	65	DO 0
GND	32	66	GND
RSVD	33	67	RSVD
GND	34	68	GND

Figure 8. NI SMB-2146 VHDCI Connector Pinout

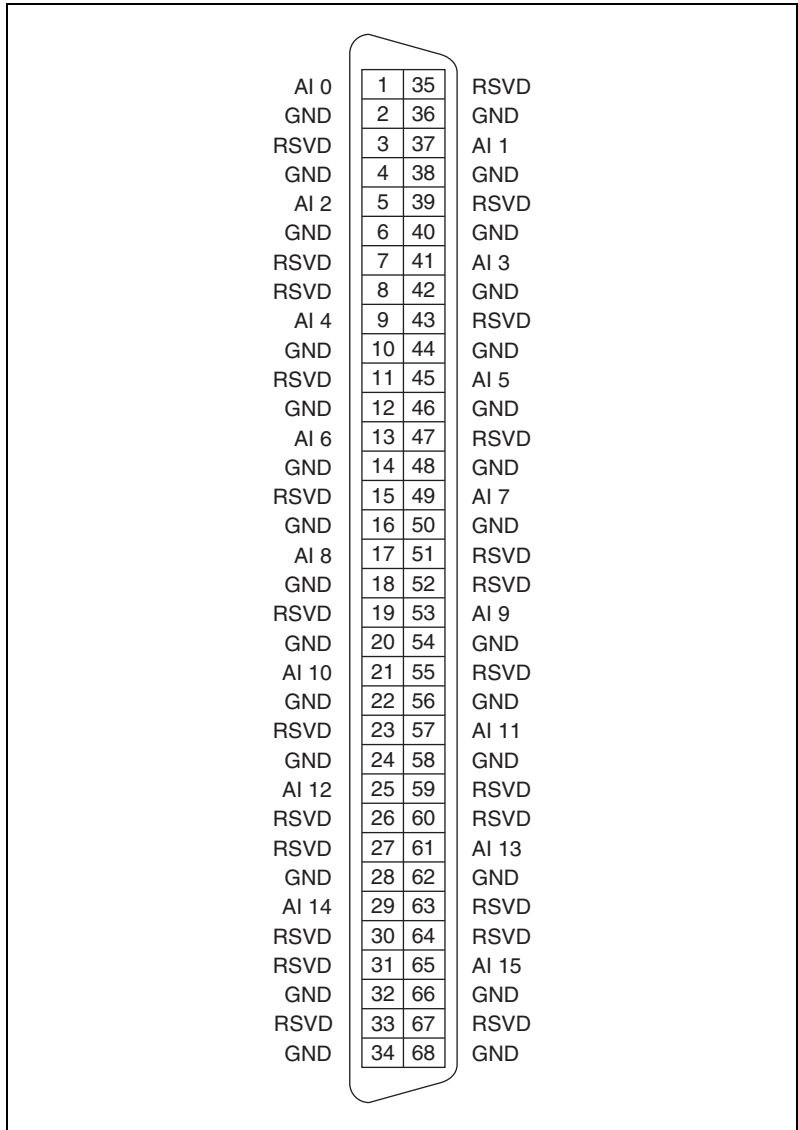


Figure 9. NI SMB-2147 VHDCI Connector Pinout

RSVD	1	35	RSVD
GND	2	36	GND
RSVD	3	37	RSVD
GND	4	38	GND
RSVD	5	39	RSVD
GND	6	40	GND
RSVD	7	41	RSVD
RSVD	8	42	GND
RSVD	9	43	RSVD
GND	10	44	GND
RSVD	11	45	RSVD
GND	12	46	GND
RSVD	13	47	RSVD
GND	14	48	GND
RSVD	15	49	RSVD
GND	16	50	GND
DI 7	17	51	DI 6
GND	18	52	RSVD
DI 5	19	53	DI 4
GND	20	54	GND
DI 3	21	55	DI 2
GND	22	56	GND
DI 1	23	57	DI 0
GND	24	58	GND
DO 7	25	59	DO 6
RSVD	26	60	RSVD
DO 5	27	61	DO 4
GND	28	62	GND
DO 3	29	63	DO 2
RSVD	30	64	RSVD
DO 1	31	65	DO 0
GND	32	66	GND
RSVD	33	67	RSVD
GND	34	68	GND

Figure 10. NI SMB-2148 VHDCI Connector Pinout



Note For additional shielding, you can connect the shield ground connector on the NI SMB-214x to earth/hard ground. This terminal is connected to the shielded enclosure ground. The shield ground lug is shown in Figures 1 through 4.

Cleaning the Accessory

Disconnect all cables to the NI SMB-214x before cleaning. To remove light dust, use a soft, nonmetallic brush. To remove other contaminants, use alcohol wipes. The unit must be completely dry and free from contaminants before returning to service.

Specifications

These specifications are characteristic at 25 °C unless otherwise noted.

NI SMB-2145

Analog Input

- Analog input channels..... 16, single-ended
- Typical propagation delay
through NI SMB-2145 1.2 ns
- Typical channel-to-channel skew..... ±35 ps
- Typical trace
characteristic impedance 50 Ω
- Maximum voltage rating..... 5.5 V or the maximum input
voltage of the NI 5752 analog
inputs, whichever is less

Physical

- Dimensions..... 30.5 cm × 4.5 cm × 26.5 cm
(12.0 in. × 1.77 in. × 10.43 in.)
- Weight..... 1,380 g (48.7 oz.)
- I/O connectors One 68-pin VHDCI connector,
16 SMB jack connectors,
one banana-style connector

NI SMB-2146

Digital I/O

Digital output channels	16, single-ended
Digital input channels	2, single-ended
Typical propagation delay through NI SMB-2146	1.2 ns
Typical channel-to-channel skew	±35 ps
Typical trace characteristic impedance	50 Ω
Maximum voltage rating	5.5 V or the maximum input voltage of the NI 5752 digital inputs, whichever is less

Physical

Dimensions	30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)
Weight	1,380 g (48.7 oz.)
I/O connectors	One 68-pin VHDCI connector, 18 SMB jack connectors, one banana-style connector

NI SMB-2147

Analog Input

Analog input channels	16, single-ended
Typical propagation delay through NI SMB-2147	1.2 ns
Typical channel-to-channel skew	±35 ps
Typical trace characteristic impedance	50 Ω
Maximum voltage rating	5.5 V or the maximum input voltage of the NI 5751 analog inputs, whichever is less

Physical

Dimensions.....	30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)
Weight.....	1,380 g (48.7 oz.)
I/O connectors	One 68-pin VHDCI connector, 16 SMB jack connectors, one banana-style connector

NI SMB-2148

Digital I/O

Digital input channels	8, single-ended
Digital output channels	8, single-ended
Typical propagation delay through NI SMB-2148	1.2 ns
Typical channel-to-channel skew.....	±35 ps
Typical trace characteristic impedance	50 Ω
Maximum voltage rating.....	5.5 V or the maximum input voltage of the NI 5751 digital inputs, whichever is less

Physical

Dimensions.....	30.5 cm × 4.5 cm × 26.5 cm (12.0 in. × 1.77 in. × 10.43 in.)
Weight.....	1,380 g (48.7 oz.)
I/O connectors	One 68-pin VHDCI connector, 16 SMB jack connectors, one banana-style connector

Compliance and Certifications

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit ni.com/environment/weee.

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